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PLANT — ANIMAL ASSOCIATION IN RELATION TO GROUSE LOCUSTS (ORTHOPTERA : TETRIGOIDEA)

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ABSTRACT

The grouse locusts are very much inter-related with the plants. The paper discusses interaction of these insects with plants and the effect has been studied in laboratory experiments and found some mosses, fungi, algae, *Oriza sativa* (Paddy) and some sprouting cereals act as common feed. The structural modifications in their mandibles are specialized to make them functional with the type of feed they take.

INTRODUCTION

The grouse locusts are small Orthopteran insects. Although universal in distribution they predominantly occur in the Oriental region. Different species of tetrigids are observed near fresh water bodies, in marshy places or in hilly regions.

Despite their interesting features and abundance in the Indian region, much work needs to be done towards understanding bioecology and other aspects of these insects. Our centre is actively engaged in such studies on grouse locusts for the past few years. From amongst our on-going studies on tetrigids the observations related to plant-animal interaction are presented in this paper.

MATERIALS AND METHODS

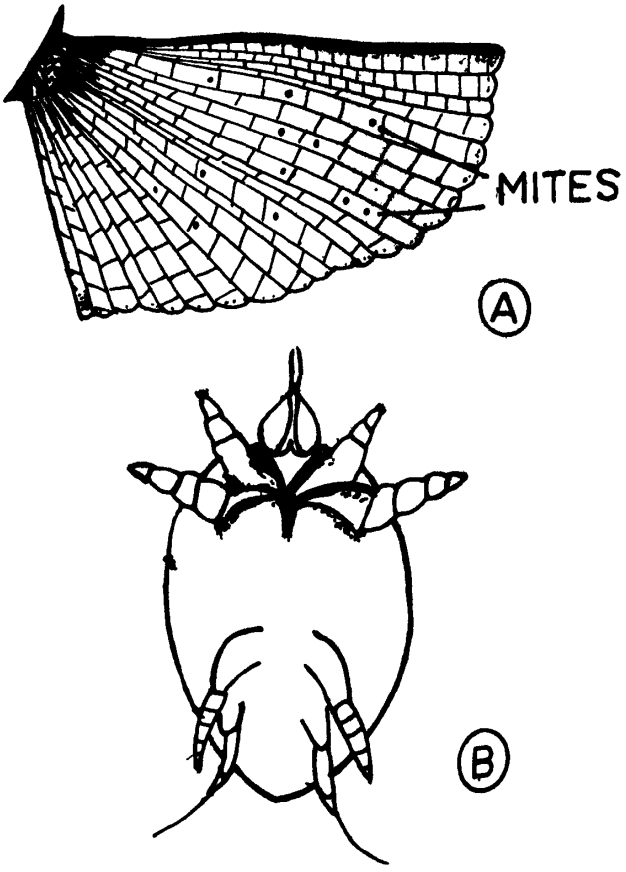
For understanding the type of food plants; field observations and laboratory experiments were carried out on some representative forms of tetrigids under study. From the point of view of plant-insect interaction, studies were initiated to understand relationship of the *Potua sabulosa* Hancock with bryophytes, especially moss. As a part of animal insect interaction an interesting association of a tarsonemid mite with *Euscelimena harpago* Serv. was noted while examining the hind wings of the grouse locusts. Permanent slides of several mites were prepared and examined under the microscope. Camera lucida drawings were made from the suitable specimens.

RESULTS AND DISCUSSION

The grouse locusts primarily feed on humus and lower plants such as algae, fungi and bryophytes that are readily available in the same habitat. Some tetrigids also feed on the sproutings of grasses and cereals such as paddy and some, occasionally resort to necrophagy. It is further interesting to note that *Potua sabulosa* shows a peculiar relationship with moss, as its principal food material, which is described later.

Due to the soft nature of food in general, the mandibles of tetrigids show structural and functional specialization somewhat different from the acridids as well as other Orthopteran insects. The basic structural and functional details of the mandible in these insects are already described by Gangwere (1965) and Paranjape (1985). Our detailed studies further reveal that there are some differences in the mandibular pattern amongst the tetrigids as a manifestation of plant-insect interaction as far as the diet is concerned.

Potua — Moss interaction: Potua sabulosa, commonly called as pigmy locust occurs at high altitude localities such as Mahabaleswar (Alt. 1573 m), Sinhgad (Alt. 1436 m) in Maharashtra. While studying its distribution and behaviour, it was found to be always associated with thick mats of moss and other bryophytes (Paranjape & Bhalerao, 1985). As is known, the mosses flourish in wet, humid regions like mountain forests of the tropics and the sub-tropics. Some of the mosses can withstand drought conditions and grow in exposed areas such as on soil surface, fence-walls, rocks, old buildings and the tree trunks. These exposed, moss covered locations serve as habitats for the pigmy locusts. The life cycle of moss generally indicates a coincidence of the growth of gametophyte with the rainy season. Our observations on the life cycle of *P. sabulosa* (Paranjape & Bhalerao, 1985) in the habitat mentioned above, suggests a close interaction between moss and the pigmy locusts. The observations further suggest that this interaction is mainly due to the preferential feeding of *P. sabulosa* on moss, although other aspects cannot be ruled out. Further studies to determine the cause-specificity of this *Potua*-moss interaction are in progress.



A. Hindwing of *Euscelimena* showing mites. × 6.
B. Tarsonemid mite. × 100 (ventral view).

Euscelimena — Mite interaction: In our detailed investigations on the widely distributed *Euscelimena harpago,* the semi-aquatic grouse locust, certain mites were found to be associated with some of the collected specimens. This, incidentally, is the first record. The acarines together with different stages of their life cycle were found in the fan-like folds of the membranous hindwings of the insect (Figure). The mites were not found on any other part of the body. The fan-like folds of the hindwings afford greater safety to the mites because the folded hindwings are normally protected under the roof-like, extended pronotum which is characteristic of tetrigids. Thus, the mites cannot be warded off by the cleaning action of the hindlegs. The preliminary taxonomic studies indicate that this mite belongs to the group Tarsonemoidea which is considered to be representing the basic stock (Krantz and Lindquist,1979). The tarsonemid mites are known to be feeding primarily on algae and fungi, while some are predaceous (Krantz, 1978). Studies are therefore in progress to know more about the interaction between these tarsonemid mites and *E. harpago.* It is felt that these studies also hold promise to eventually know more about the etho-ecology and phylogeny of tetrigids.

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